

THE USE OF IN-HOUSE RESOURCES BY A MUNICIPALITY TO CONDUCT A DETAILED WATERSHED ASSESSMENT

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Abstract. As reported in the 1999 Conference Proceedings (Bourne and Bowers 1999) an in-house basin study was initiated in late 1998 to evaluate the condition of the R. L. Sutton Basin. The R. L. Sutton Water Reclamation Facility (WRF) is currently designed to treat an average of 40 MGD. The Cobb County Water System (CCWS) is procuring engineering services for the design of a 60 MGD WRF. EPD required that a watershed study be completed before the construction documents for expansion will be approved.

After reviewing the criteria for a watershed study, CCWS found they possess the in-house resources to conduct the research using their own Water Quality Laboratory. The county's Stream Monitoring Program collects routine water quality data from 137 sites located on county streams and has contributed a wealth of historical information from sites within the study area. Additionally, with cooperation from the USGS, Cobb County obtained additional information and the use of a USGS gauging/sampling station located within the study area.

INTRODUCTION

Cobb County is facing ever increasing demands to monitor and report on the quality of its surface waters. Cobb County's response to these challenges has been to expand and intensify its pre-existing stream monitoring program. The decision by Cobb County to use its in-house program to conduct the R. L. Sutton Basin Study was a critical part of this process. The decision to build upon our Stream Monitoring Program will enable the county to avoid constant outsourcing costs for surface water studies and allow the county more flexibility when addressing surface water issues. The major focus of this paper is to discuss the nature and scope of the R. L. Sutton Basin Study both as a research and permit compliance project as well as illustrate benefits created by the study that will greatly enhance Cobb County's ability to address future water resource concerns.

STUDY SITES

Twelve sampling stations and one reference station have been identified for the R. L. Sutton Study. The study area, located in eastern Cobb County, encompasses streams already being sampled through the Stream Monitoring Program. Pre-existing stream monitoring sites were preferred whenever possible due the abundance of historical data. Many of the routine monitoring stations were originally selected using criteria similar to that used in the study. Water quality measurements have been collected at all stations. Benthic macroinvertebrate samples have been collected at ten stations and fish were collected at seven.

Sampling stations for the assessment were located in areas representative of land uses typically found in the study area. This will help evaluate effects of non-point source impacts on the watershed. Furthermore, this information will aid in addressing solutions to water quality problems created by both present and projected land use. In addition to land use, sites were also chosen for particular habitat characteristics. CH2MHill personnel assisted in selecting sites with similar habitats which also comply with habitat assessment criteria set forth in EPD's Standard Operating Procedures. The sampling stations selected represent three sub-basins in the watershed: Sope Creek, Rottenwood Creek, and Vinings. A tributary of Snake Creek, in Carroll County has been chosen as the reference station.

CHEMICAL MONITORING

Water quality sampling has included both wet and dry weather sampling, which was coordinated and supervised by the CCWS water quality laboratory. To date, seven rain events have been sampled and sampling will continue as part of an ongoing program to gather as much stormwater data as possible. The water quality laboratory is performing the analysis on all samples, insuring samples are run in a timely manner at minimal cost to the

county. The CCWS laboratory has an extensive QA/QC program in place for both analysis and sampling. Running the samples in house will give the laboratory better supervision over methods and QA/QC.

Dry weather samples have been collected at all study sites to establish base line conditions. Data continues to be collected for some of the study sites through our on going stream monitoring program. Biological sites were also sampled for chemical parameters when biological sampling was conducted. An automated sampler has been utilized at the USGS gauging station located on Lower Roswell Road to gather flow data during sampled rain events.

The U.S. Geological Survey (USGS) is providing information on the hydrologic data from their gauging station at Sope Creek on Lower Roswell Road. Flow data collected from this site will be used in model calibration and assist us with loadings calculations. The USGS has historical sampling data from Sope Creek and continues to collect grab samples from the Lower Roswell Road site as part of their NAWQA study.

MACROINVERTEBRATE STUDIES

Macroinvertebrate studies will be conducted using the State of Georgia SOP for Fresh Water Macroinvertebrate Assessment. CCWS is using the Rapid Bioassessment Protocol III (RBP III), the most thorough of the assessment techniques in the SOP. The North Carolina SOP and the EPA Rapid Bioassessment Protocol were also consulted. Cobb County Stream Monitoring personnel consulted with biological monitoring personnel from CH2MHill for a review of their biological field sampling techniques. A slight deviation was made from the state protocol in the sample processing. After reviewing various SOP's, sampling categories were created based upon habitat and substrate. In all, five categories were established: roots, gravel, scrapes, sand and leaf packs. Samples for each category were collected and processed separately, then identified by site name and category. This allows each site to be analyzed as separate categories and composited as a whole. Hopefully this will shed more light on the relative health of each biological community. Finding complete parity between study sites is exceedingly difficult and these categories will enable us to examine like habitats between different sites. This will be useful if a particular site is lacking in relative abundance of one habitat or another. Our field personnel established their own field elutriation protocol utilizing the standard sieve bucket and a bucket sieve. The bucket sieve, which has a 1 cm² aperture size,

is placed in the opening of the 30 mesh sieve bucket. Samples are poured through both sieves, thereby greatly decreasing the amount of elutriation necessary in the laboratory.

Cobb County is utilizing in-house resources to identify macroinvertebrates to the lowest taxonomic level. Voucher specimens and all chironomids are being sent to a taxonomist for verification. All voucher specimens will be retained by Cobb County for future use in studies and routine monitoring.

FISH SAMPLING

Fish samples were collected by fisheries biologists from CH2MHill and Cobb County Stream Monitoring employees. Fish were collected utilizing a battery powered electro-shocker. Larger specimens were identified in the field, all others were brought back to the lab for identification. Specimens were identified by CH2MHill fisheries biologists and Cobb County Stream Monitoring personnel. Voucher samples were retained by the county and have been used in subsequent fish studies. Cobb County has obtained a collectors permit and follows State Fish and Wildlife protocols for fish studies and fish kill investigations.

EVALUATION OF BIOLOGICAL DATA

The RBP III and RBP V (Plafkin et al., and Ga DAR) methods provide metric parameters for analyzing the physical, habitat, chemical and biological data and will be used for data analysis. Other metrics (more tailored to the southeast Piedmont region) will be consulted, including the North Carolina SOP for Biological Monitoring. The Index of Biological Integrity (Plafkin et al., 1989) has been used for fish evaluation. The Georgia Department of Natural Resources has created their own version of the protocol and made it available to the CCWS. This IBI is modified to best represent streams in Georgia. Regional reference sites are also established in the IBI. We compared all sites, including our reference sites, to the regional reference sites used in the state SOP. Our best reference site rating scored a good on the State of Georgia IBI.

Habitat assessments were conducted using the protocol provided in the State of Georgia SOP. Scores were recorded and will be used when evaluating macroinvertebrate data and when considering the opportunities for habitat restoration.

ANALYSIS OF CHEMICAL DATA

Data evaluation will focus on a direct comparison to the chemical data from each station. CCWS personnel will evaluate all chemical data generated by this study. The Urban Streams Assessment Guideline Manual written by the state EPD in cooperation with the ARC is also being used to evaluate chemical data. The criteria for this index was written into a standard Lotus Spreadsheet. The reference database was made available in digital format by State of Georgia EPD.

Cobb County plans to use the BASINS model to evaluate data from this study. The model will be calibrated using chemical data collected by CCWS and USGS. Flow measurements from the USGS gauging station located on Roswell Road will also be used in model calibration. Loadings calculations will be calculated from hourly concentrations and flow data. Current and future loadings for the R. L. Sutton WRF will be estimated. The non-point source loadings will be calculated using land use data and export coefficients for each land use category. Current land use will be obtained from 1995 ARC land use data and Cobb County Community Development data. Cobb County is currently in the process of updating its land use data using aerial photography and Geographic Information Systems (GIS). These efforts will provide the CCWS with accurate land use data in the near future. Stream monitoring is using Global Positioning Systems (G.P.S.) to locate the sites in the R. L. Sutton Study. Contour maps are also being created and included as part of the GIS layering. This will provide accurate information about the nature of drainage areas in the study. Population projections will be evaluated from future land use analysis. Available population projections will also be considered. The current and future point source loadings will be calculated using NPDES discharge monitoring reports.

Based on the findings of the study loadings analysis recommendations will be formulated for watershed protection and improvement of water quality. If analysis determines that non-point source controls are necessary, the specific best management practice (BMP) will be investigated and the level of pollution reduction expected from each BMP will be determined. If point source controls are required to meet water quality goals, strategies for reducing point source pollution will be developed. Since Cobb County personnel are actively involved in the study we will possess more insight into data analysis than would otherwise be possible. Also, cooperation and communication between various departments necessary for implementation of any

remediation plan will already be established. Information from this study can be integrated with the existing monitoring programs such as the stream monitoring program to further strengthen our knowledge of problems facing not only the study basins but all of Cobb County's surface waters. This cooperation in data collection and analysis can also translate into substantive problem solving advantages when confronting the problems facing urban watersheds. This would not be possible if the county took a passive attitude toward watershed assessment.

LITERATURE CITED

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